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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/557,697	11/22/2005	Ian Raymond Little	4702-32	7895
23117 7590 03/11/2008 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER				
BULLOCK, IN SUK C				
ART UNIT		PAPER NUMBER		
1797				
MAIL DATE		DELIVERY MODE		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/557,697

Applicant(s)

LITTLE ET AL.

Examiner

In Suk Bullock

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Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 November 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 15-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 15-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/CS-100)
Paper No(s)/Mail Date 11/22/05 & 1/18/06
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Observations

The following corrections are suggested: in claims 15 and 21 "non metallic" should be changed to "non-metallic" and in claim 23 "non catalytic" should be changed to "non-catalytic".

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 15, 16, 20-22, 24, and 25 are rejected under 35 U.S.C. 102(b) as anticipated by WO 01/68571 A1 (hereinafter "WO").

The WO reference discloses a process for the production of an olefin from a hydrocarbon comprising contacting the hydrocarbon and a molecular oxygen-containing gas with a catalyst under auto-thermal conditions sufficient to produce the olefin, wherein the catalyst comprises at least one metal selected from the group consisting of Group IIIA, Group IVA and Group VA and at least one transition metal, i.e., iron, ruthenium, osmium, cobalt, rhodium, rhenium, iridium, and nickel (Group VIIIB) (page 2, line 10 to page 3, line 30). The catalyst may be supported on any suitable support including metallic supports. The support may be wash-coated with γ -Al₂O₃ (this is equivalent to the claimed non-metallic coating limitation). The metallic support has a

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continuous multi-channel structure, such as foam, a regular channeled monolith or a fibrous pad (this reads upon the claimed metallic structured packing limitation). See page 6, lines 10-31. The preferred stoichiometric ratio of hydrocarbon to oxygen is 5 to 16 times the stoichiometric ratio of hydrocarbon to oxygen required for complete combustion of the hydrocarbon to carbon dioxide and water (page 8, lines 1-5). Hydrogen is co-fed with the hydrocarbon and molecular oxygen-containing gas into the reaction zone (page 8, lines 18-22).

Although the reference does not explicitly disclose wherein the metallic support comprises a series of blocks or layers that tessellate together to leave no gaps, this is an inherent proper of a structured packing. Therefore, the limitation is met by the reference.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 17-19 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 01/68571 A1 (hereinafter "WO") in view of US 2004/0072685 A1 to Chen et al. (hereinafter "Chen").

The WO reference discloses a process for the production of an olefin from a hydrocarbon comprising contacting the hydrocarbon and a molecular oxygen-containing gas with a catalyst under auto-thermal conditions sufficient to produce the olefin, wherein the catalyst comprises at least one metal selected from the group consisting of Group IIIA, Group IVA and Group VA and at least one transition metal, i.e., iron, ruthenium, osmium, cobalt, rhodium, rhenium, iridium, and nickel (Group VIIIB) (page 2, line 10 to page 3, line 30). The catalyst may be supported on any suitable support including metallic supports. The support may be wash-coated with γ - Al_2O_3 . The structure of the support material is important, as this may affect flow patterns through

the catalyst. Such flow patterns may influence the transport of reactants and products to and from the catalyst surface, thereby affecting the catalyst's activity. The metallic support has a continuous multi-channel structure, such as foam, a regular channeled monolith or a fibrous pad. The pores of foam monolith structure tend to provide tortuous paths for reactants and products. Such supports may have 20 to 80, preferably 30 to 50, pores per inch (ppi). See page 6, lines 10-31. The preferred stoichiometric ratio of hydrocarbon to oxygen is 5 to 16 times the stoichiometric ratio of hydrocarbon to oxygen required for complete combustion of the hydrocarbon to carbon dioxide and water (page 8, lines 1-5). Hydrogen is co-fed with the hydrocarbon and molecular oxygen-containing gas into the reaction zone (page 8, lines 18-22). The process is operated at a pressure with the range of between 2 to 50 bara (page 8, lines 30-33).

The WO reference fails to disclose the specifically claimed metallic support selected from FeCrAlY, NiCrAlY, CoCrAlY, Ni-chrome, Inconel and Monel as recited in claim 17.

The reference to Chen discloses a high temperature, oxidation-resistant, aluminum containing oxide-dispersion strengthened (ODS) alloy-supported catalyst for use in ODH comprising a MCrAlY support wherein M is a base metal or combination of base metals. A base metal is defined as a non-Group VIII metal with the exception of iron, cobalt and nickel. M is preferably iron, cobalt, or nickel. See page 1[0001] and page 2[0018]. The catalysts are supported on any of various three-dimensional structures including, but not limited to, foams, honeycombs, or other configurations having longitudinal channels or passageways permitting high space velocities with a

minimal pressure drop. The supports have approximately 20 to 120 ppi (page 3[0022]). The supports also contain a protective surface layer composed of alpha-alumina (page 3[0024 & 0028]). The catalyst supports are coated with active metal components such as Group VIII (page 3[0023 and 0029]).

It is acknowledged that Chen is directed to oxidative dehydrogenation processes, an autothermal process. Further, Chen teaches the need for catalyst supports which can withstand high temperatures ($>700^{\circ}\text{C}$), i.e., characteristics such as thermally stable and high mechanical strength (page 1[0006] and [0009]). The WO reference is directed to an autothermal cracking process which is conducted at a high temperature range (between 900 and 1000°C , see page 8, lines 27-29) which is similar to ODH processes. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of WO by employing the MCrAlY supports taught by Chen because Chen has taught that such supports employed in high temperatures demonstrate greater thermal and have sufficient mechanical strength (page 1[0006] and [0009]; page 2[0016]; and page 3[0023]).

With regard to the claimed monolith having between 2000 cpi to 5 cpi as called for in claim 19, both WO and Chen disclose that the structure of the support material is important, as this may affect flow patterns through the catalyst. Both references, also, disclose the support may be in the form of foam and a regular channeled monolith among others. Since both WO and Chen discloses a foam structure having pores per inch which is within or overlapping the claimed range, it would have been expected that

the metallic support in the form of a monolith would have number of cells per inch which would be within the claimed range.

With regard to the claimed non-catalytic resistance zone being located upstream of the catalyst as called for in claim 23, it is known to those skilled in the art that it is a standard practice to place an inactive non-catalytic material of the same shape and size as the catalyst at the top and bottom of a fixed bed reactor to aid in reducing the end-effects and to achieve fully developed flow in the catalytic zone.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to In Suk Bullock whose telephone number is 571-272-5954. The examiner can normally be reached on Monday - Friday 6:00-2:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Glenn A Caldarola/
Acting SPE of Art Unit 1797

/In Suk Bullock/

Examiner, Art Unit 1797